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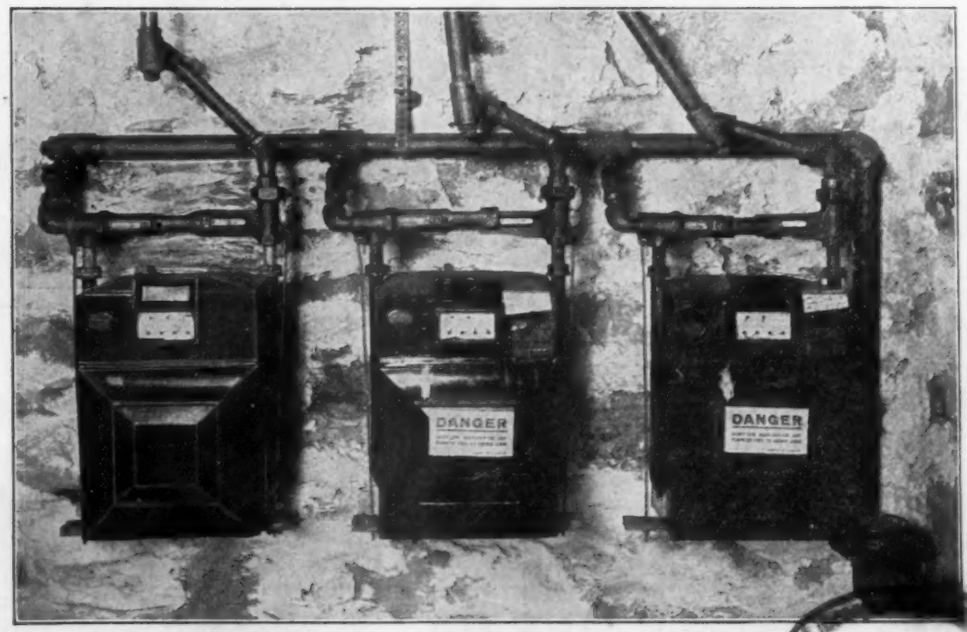

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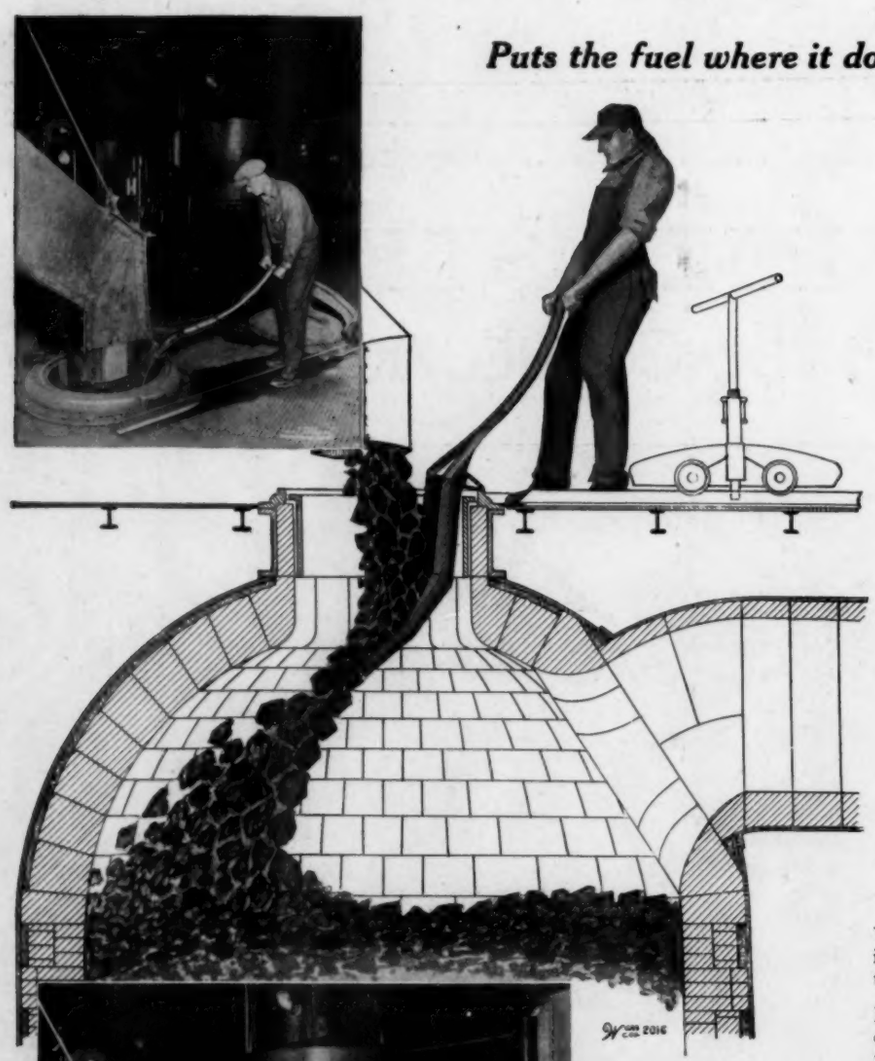

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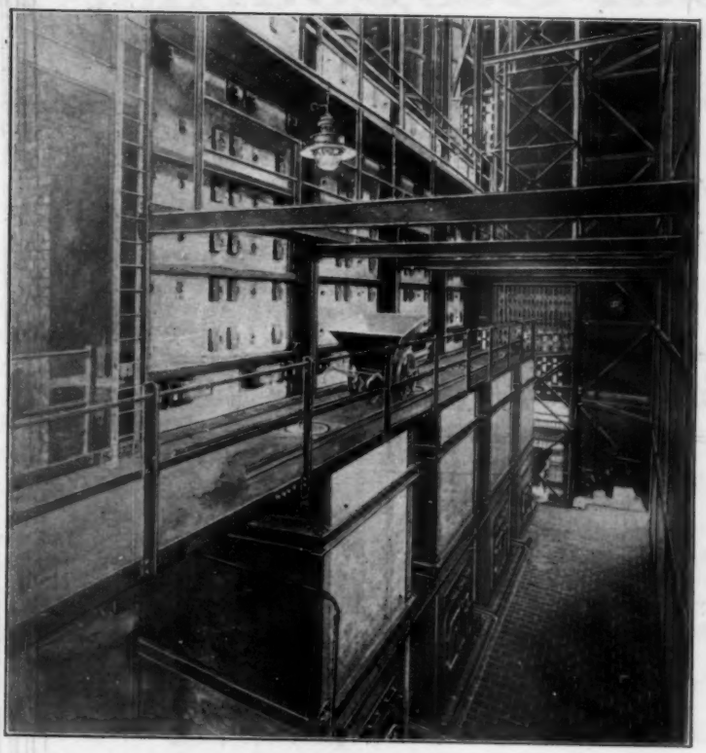

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American Gas Journal

SIXTY-THIRD YEAR

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Graphic Charts of Gas Generator Operation

The Advantages to Be Gained

By A. W. H. GRIEPE

The advantages gained in showing the various operations in gas generators by means of the Gibb triangular charts have not been known well enough to be thoroughly appreciated. The charts, if properly plotted, will show at a glance the various stages of gasification of any fuel, gas constituents, etc.

Authorities like Ostwald, the inventor of this system, W. Clauss and L. Neusell have recommended this method, as it shows plainly the difficult gasification periods during the operation of gas generators.

The operation of gas generators can be divided into three distinct periods, to wit: the drying period, the distillation period, and the gasification period. While the fuel is in the drying period or zone the moisture is removed by the hot gases, during the distillation period the volatile matter of the fuel is liberated, and, finally, during the gasification period the carbon is gasified. The most important period is the latter, as the quality of the final product depends entirely on the proper operation during this period. As the carbon contents of the coke is the starting point of the gasification process, it is obvious that the quality of the final gas produced is more dependent on the gasification period than on the characteristics of the fuel itself, especially so as the gas characteristics are determined after cooling and purification and after all tar vapors have been removed which were produced by the volatile matter of the fuel.

In actual operation, especially when using fuel that is not of uniform size, the location of the various zones shifts in regard to the height of the fuel bed in the generator and fuel particles enter the gasification zone, whose surface is already burnt to coke, while the volatile matter is still retained by the fuel particles. Now, when the coke begins to gasify, this volatile matter, when passing through the high temperature fuel bed, is formed into permanent gases; their carbon contents are therefore influenced by the same condition as the gas produced by the solid carbons (coke). H_2 contents are burnt to H_2O and produce finally the same gas as the fixed carbon in the gasification period.

The final result of the gasification period is in all cases CO_2 (carbon dioxide), H_2 (hydrogen), CO (carbon monoxide); besides these gases, there are traces of CH_4 and other hydrocarbons. The amount of methane, which is a permanent gas, depends more on the fuel than on the operation of the gas generator, and can therefore be considered a product of the distillation period instead of the gasification period.

A confirmation of above is found in generators using coke as a fuel, as only small traces of methane are found in the produced gas regardless of generator operation.

Important gases in the gasification process are therefore only CO_2 (carbon dioxide), H_2 (hydrogen), CO (carbon monoxide), and these gases are the bases for the plotting of the triangular charts showing the gasification process.

Ostwald assumes that it is entirely immaterial, from a thermochemical as well as from an energy point of view, by which process the final gas is obtained, provided the fuel is the same in all cases and the gas constituents are uniform.

From the many possible reactions encountered in the gasification process of carbon three main formulas may be selected which are the most suitable to be used in the triangular charts. They are:

$$(1)\ldots. C + O = CO_2 + 97.6$$
$$(2)\ldots. C + H_2O = CO_2 + 2H_2 - 18.8$$
$$(3)\ldots. C + CO_2 = 2CO - 38.8$$

Each of the formulas is used to designate one corner of the triangular chart. Any point inside of the triangle represents, therefore, a gasification process in which any of the three cardinal reactions are contained in certain specified proportion, and every point in the chart shows a certain gas of specified constituents.

This may be explained by examples which show a few characteristic gasification processes.

In gasification chart, Fig. 1 is:

Point (a): Formula (1) gasify 100% carbon
Formula (2) gasify 0% carbon
Formula (3) gasify 0% carbon

Result: $100\ C + 100\ O_2 = 100\ CO_2 + 9{,}670$ k. cal. or complete combustion.

Point (b): Formula (1) gasify 0% carbon
Formula (2) gasify 100% carbon
Formula (3) gasify 0% carbon

Result: $100\ C + 200\ H_2O = 100\ CO_2 + 200\ H_2 - 1{,}880$ k. cal., or complete hydrogen reaction.

Point (c): Formula (1) gasify 0% carbon
Formula (2) gasify 0% carbon
Formula (3) gasify 100% carbon

Result: $100\ C + 100\ CO_2 = 200\ CO - 3{,}880$ k. cal., or complete carbon dioxide reduction.

Point (d): Formula (1) gasify 50% carbon
Formula (2) gasify 0% carbon
Formula (3) gasify 50% carbon

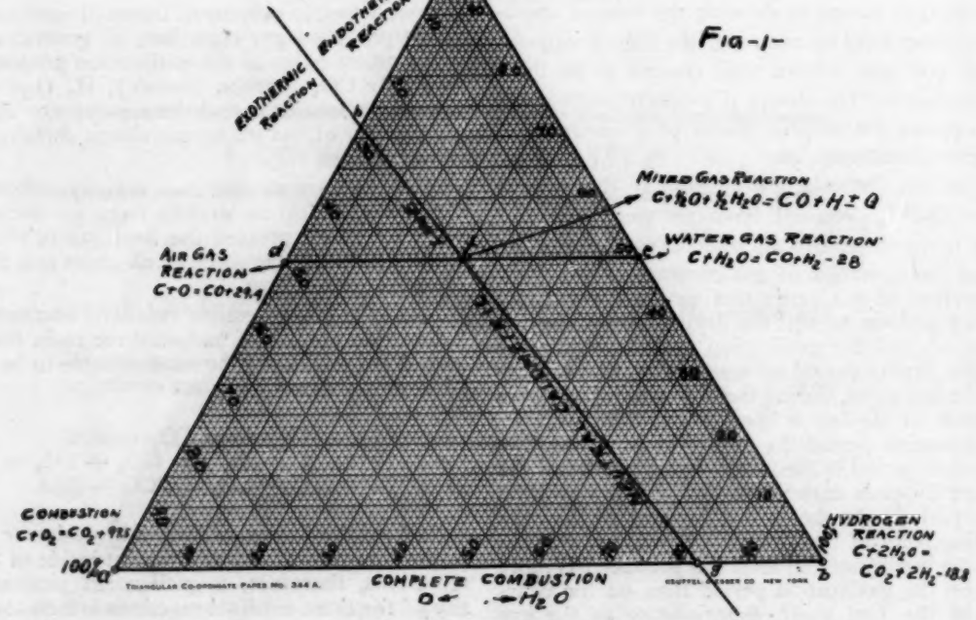
Result:

$50\ C + 50\ O_2 = 50\ CO_2 + 4{,}880$ k. cal.
$+ 50\ C + 50\ CO_2 = 100\ CO - 1{,}940$ k. cal.

$100\ C + 50\ O_2 = 100\ CO + 2{,}940$ k. cal.

or theoretical air gas reaction.

Point (e): Formula (1) gasify 0% carbon
Formula (2) gasify 50% carbon
Formula (3) gasify 50% carbon



Result:

$50\ C + 100\ H_2 = 50\ CO_2 + 100\ H_2 - 940$ k. cal.
$+ 50\ C + 50\ CO_2 = 100\ CO - 1{,}940$ k. cal.

$100\ C + 100\ H_2O = 100\ CO + 100\ H_2 - 2{,}880$ k. cal.

or theoretical water-gas reaction.

Point (f): Formula (1) gasify 25% carbon
Formula (2) gasify 25% carbon
Formula (3) gasify 50% carbon

Result:

$25\ C + 25\ O_2 = 25\ CO_2 + 2{,}430$ k. cal.
$25\ C + 50\ H_2O = 25\ CO_2 + 50\ H_2 - 470$ k. cal.
$50\ C + 50\ CO_2 = 100\ CO - 1{,}940$ k. cal.

$100\ C + 100\ H_2O + 50\ H_2O = 50\ H_2 + 100\ CO - 0$ k. cal.

or theoretical mixed gas reaction.

While the complete combustion (a) and the theoretical air gas reaction are exothermic reactions, the hydrogen reaction (a), the carbon dioxide reduction (c) and the water gas reaction are endothermic.

The mixed gas process (f) represents a calometrically neutral gasification process. When plotting in the chart other combinations, one finds that all cross a line passing through f, which may be called the neutral calometric line. This line divides the triangle into two parts, one of which contains all exothermic processes, while the other contains all endothermic processes.

For the continuous operation of generators, only the spaces a, d, f, g can be considered, as the spaces d, c, e represent gasification process, where additional carbon dioxide has to be added to the generator to keep the process going; while in spaces g, h, c, b gasification processes are shown which can only operate when additional heat is supplied to the fuel. (Production of water gas in retorts with separate furnaces or water gas generator with intermittent operation.)

It is found that in gas generator trapez a, d, f, g, the distance of points representing gasification processes from the neutral calometric line f shows the degree of efficiency of the gasification process. For all processes inside the line f the complete heat value is indicated and the efficiency in reference to the fuel is therefore 100 per cent. At complete combustion (a) the whole heat value of the fuel is liberated and the thermochemic efficiency is therefore nothing.

The efficiency of the gasification process as represented in the triangular chart differs from the over-all efficiency of generators which are operated on the steam and hot blast air, as these additions represent added heat calories.

Regulation of Gasification

In actual practice the gasification process in the gen-

erator is regulated by volumetric gas analysis. Ostwald calculated graphical means to find from the gas constituents the gasification process in the chart.

To do this one draws a line through the apex c of the chart (Fig. 2), parallel to a, b. From point c in any scale draw a distance representing 2 CO_2 + CO. From this point, x on the line c-x toward c in same scale, mark a distance representing H_2. On line a, b from a (combustion corner) mark a distance representing CO to point z. Now connect point x and z with a straight line which intersects the triangle side at y. Now draw a parallel line to x-y-z from point o, intersecting a-o at p. Now draw parallel lines to the triangle sides through points y and p. At the intersection of these lines point k is formed, representing the desired point for a certain gas composition.

(2) Lines representing equal volume ratio of CO ÷ H_2 when CO is smaller than H_2, or of H_2 ÷ CO when H_2 is smaller than CO.

(3) Lines representing equal volume ratio of H_2 ÷ CO_2 when H_2 is smaller than CO_2, or of CO_2 ÷ H_2 when CO_2 is smaller than H_2.

The chart shows very distinctly and easily discernible the harmonic relation which enables one to follow the complicated intricacies of the gasification process into the smallest details, and their application for practical operation is extremely simple. For instance, for a gas of the following analysis: 10.8 per cent CO_2, 20.6 per cent CO, 16.2 per cent H_2. And from this—

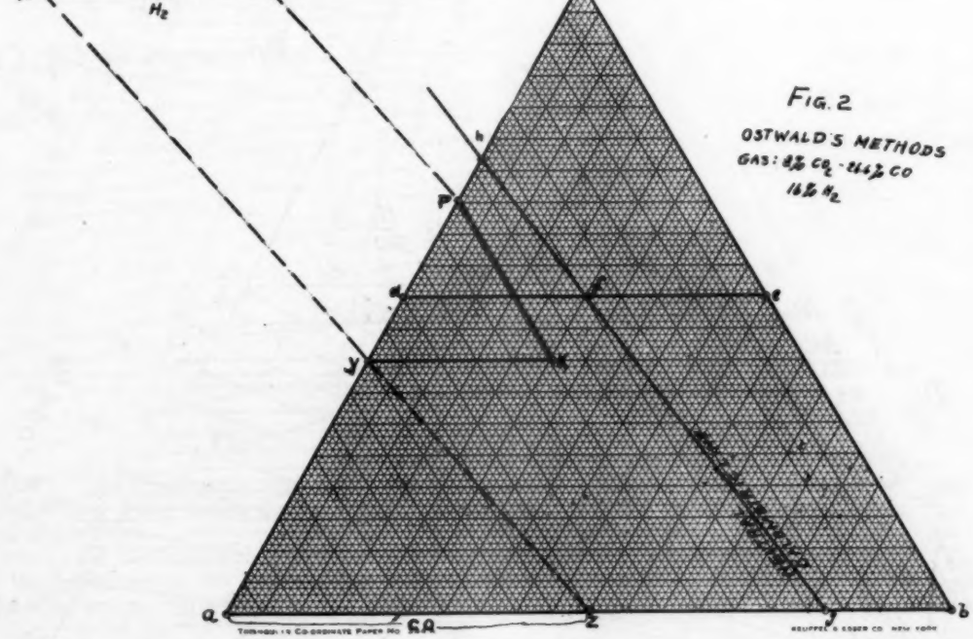


FIG. 2
OSTWALD'S METHODS
GAS: 8% CO2 - 20.4% CO
16% H2

* This method makes it necessary to use scale, T-square and triangle, which in many cases is found to be too cumbersome to find a gas in the chart. Clauss and Neusell suggest the following method to find the desired point without any drawing methods or calculations.

We use again the Gibb chart (Fig. 3), with added lines for proportion between CO_2, CO, H_2. Every gasification process as represented by the three cardinal formulas or reactions is based on a very distinctly defined gas combination, and therefore any point is accurately determined through its proportion of CO_2, CO, H_2.

The ratio of volumetric parts of CO_2, CO, H_2 can be expressed through the individual ratio of CO_2 ÷ CO, CO ÷ H_2 and H_2 ÷ CO_2. These ratios are represented in Fig. 3 through lines as found by experimental charts. They are:

(1) Lines representing equal volume ratio of CO_2 ÷ CO when CO_2 is smaller than CO, or CO ÷ CO_2 when CO is smaller than CO_2.

CO_2 < CO: CO_2 ÷ CO = 10.8 ÷ 20.6 = 0.52
CO_2 < H_2: CO_2 ÷ H_2 = 10.8 ÷ 16.2 = 0.67
H_2 < CO: H_2 ÷ CO = 16.2 ÷ 20.6 = 0.79

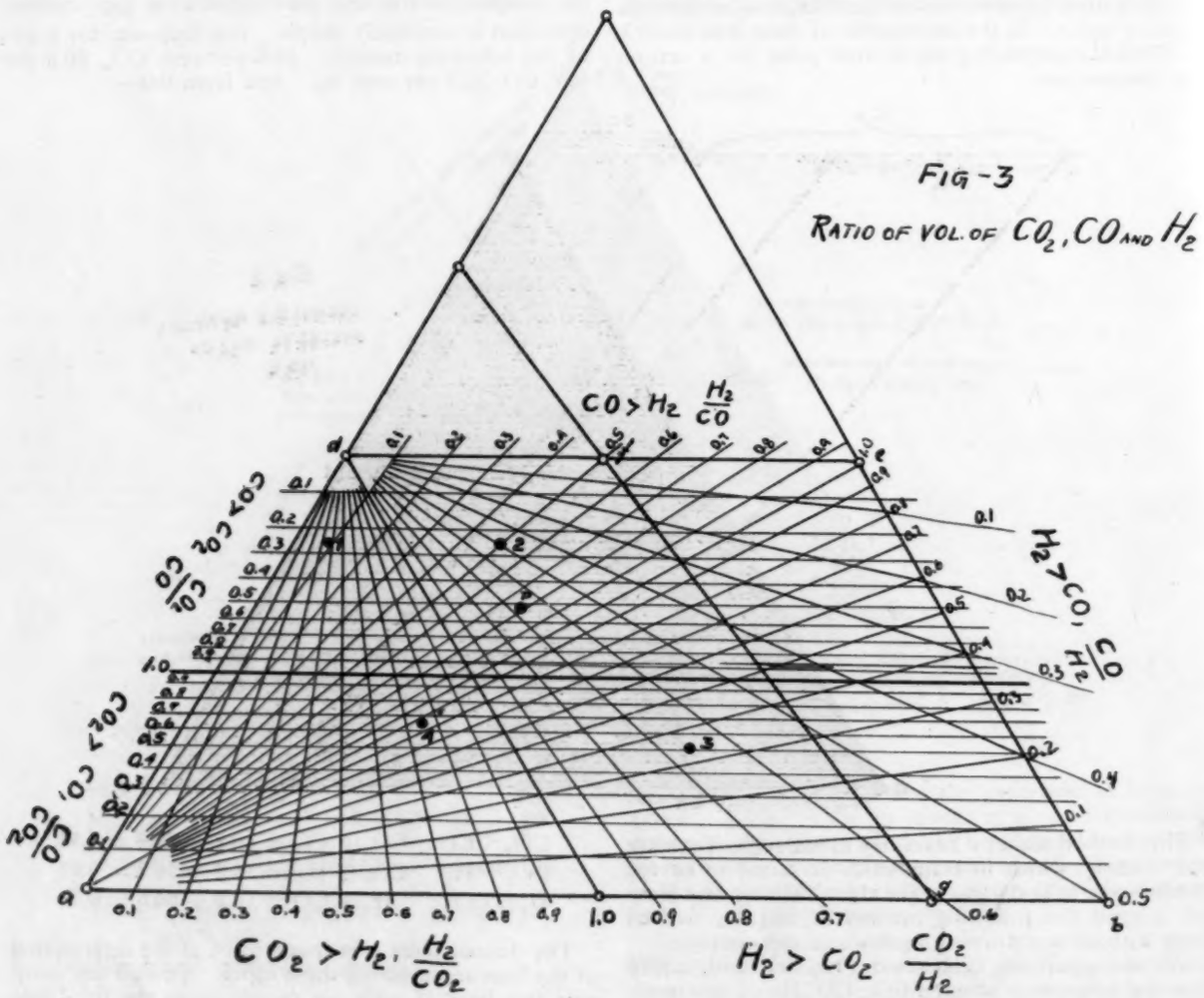
The desired point p is found to be at the intersection of the lines representing these ratios. To find any point only two lines of ratio are necessary, as the third line has to go through the intersecting point, thus giving a most effective check of the accuracy of the gas analysis. If the third line does not intersect the point it shows that for Stoechio-metric reasons the gas cannot be the result of a gasification process or the gas analysis is inaccurate.

As every point in the triangular chart represents a very distinctly determined gas combination, one can, on hand of above chart and another diagram representing the various CO_2, CO and H_2 contents, find all possible combinations of gasification processes by placing the latter diagram over the triangular chart, thus locating all points inside gasification trapez a, d, c, b. One difficulty will be encountered when using this method, and

that is the uncertainty of volumetric analysis. It is possible that through the varying addition of permanent gases, as oxygen and nitrogen, to the three cardinal gases CO_2, CO, H_2, the relative volumetric percentage has been increased or reduced as regarding the volume of the whole gas combination, while the relative percentage of CO_2, CO, H_2 remained. Under operating conditions, infiltration or dilution through air (oxygen and nitrogen) has been practically eliminated. On the other hand, the addition of methane, which depends solely on the characteristics of the fuel, reduces the volumetric contents of CO_2, CO and H_2 at an unknown variation. Based on above, it is necessary to plot a new diagram for every different grade of fuel used.

For gas manufactured from coke this is not necessary, as coke contains very little volatile matter and only small traces of methane are found in the gas. For gases produced from any other fuel it must first be determined how much methane is produced by a kilogram of fuel. For instance, a mixture of 70 per cent of raw lignite and 30 per cent of lignite briquettes produces 0.6 k. per cubic meter methane. This is based on a number of analyses.

Fig. 4 shows a diagram plotted according to above and is accurate enough for any other bituminous fuel. As the differences are so small to be negligible, the diagram can be used in connection with such fuels without interference as to the final result. The accuracy of these diagrams is partly impaired by the small angle of the interesecting lines of CO_2, CO, which causes inaccuracies in rating. On the other hand, as the diagrams can be used without any geometrical drawings or calculations, and on account of its simplicity, it is very advisable to use these charts in the operating field wherever it is possible. Naturally, as with anything new, a certain prejudice has to be overcome to make the use of these charts universal.



The use of the triangular chart is not confined only to gasification processes for the determination of gas combinations, but can also be used to find the conditions under which certain gas combinations are possible; and one can also find the combinations according to their volumetric, thermochemic or any other characteristics. For instance, one can make a diagram (Fig. 4) showing the steam or air requirements, heights of zones, volumnas, specific gravity, specific heat, heat units, combination of combustion gases, heat of combustion, etc., and uses these values to locate any of its points in the tri-

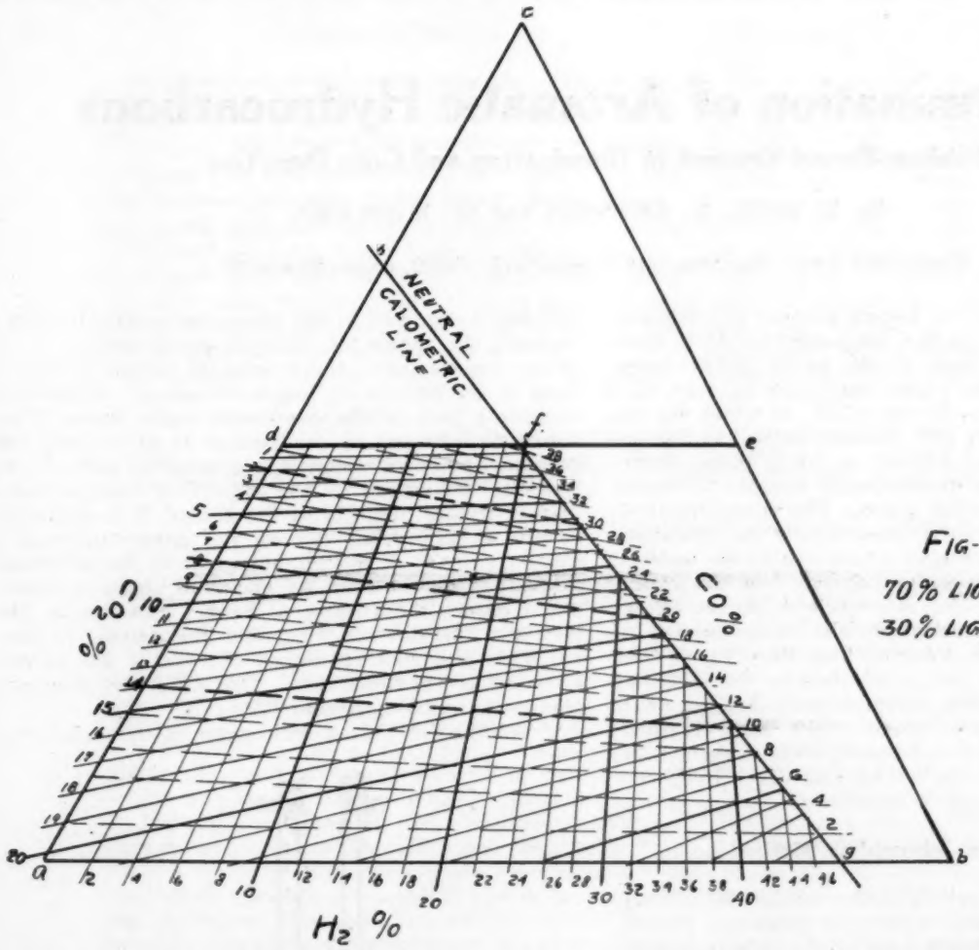


FIG-4-
70% LIGNITE
30% LIGNITE BRIQUETTES

angular chart. The combustion temperature is of the utmost importance when testing gas-fired furnaces for metallurgical purposes.

Fig. 5 shows the combustion temperature of coke gas using 1.2 theoretical air supply, plotted in the gas trapez, for combustion temperatures of different quantities by air supplied or gas made from other fuels. The curves will still be found approximately correct for comparative purposes.

Under operating conditions and for different uses gases of different characteristics are necessary to take

(*Continued on page 446.*)

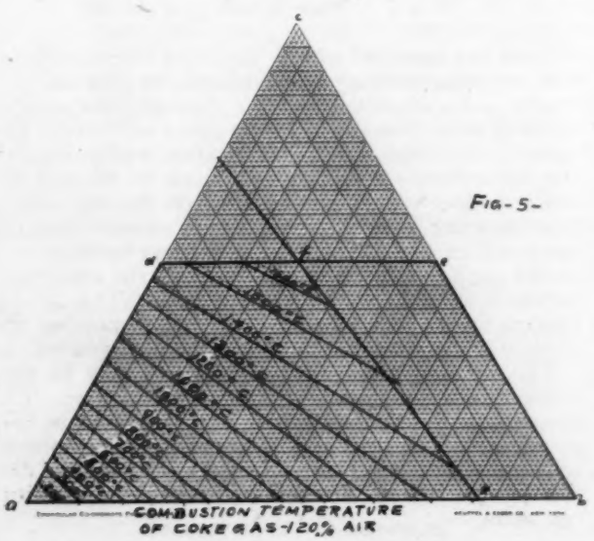


FIG-5-

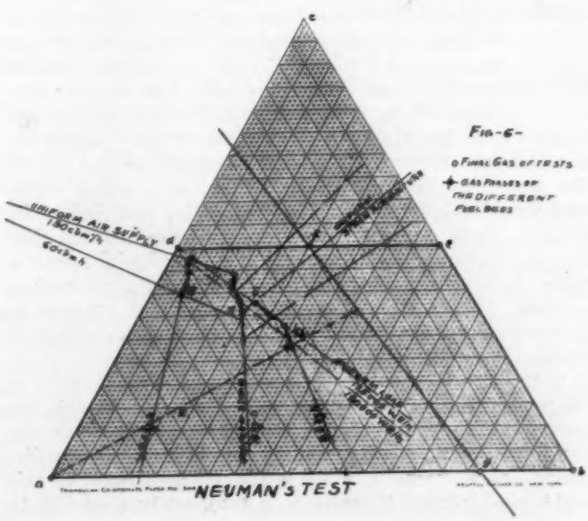


FIG-6-

Determination of Aromatic Hydrocarbons

Finding Benzol Content of Illuminating and Coke Oven Gas

By E. BERL, K. ANDRESS and W. MUELLER

Translated from "Das Gas und Wasserfach," 1922, pages 86 and 87

Up to the present the benzol content in illuminating and coke oven gas has been determined in three ways. The first of these, known as the Deville freezing method, is of no value, inasmuch as even at a temperature of minus 22 deg. Cent., to which the gas may be cooled, there still remains behind in the gas about 23.5 grams of benzol in every cubic meter. This is almost equal to the entire amount of benzol that is found in technical gases. The second method, which is called the dinitrobenzol method, possesses a number of disadvantages which render the method very difficult to carry out and detract from its usefulness so considerably that it is not used to any extent at all. These are particularly the inconvenience of the method, the high cost and long duration of time taken in carrying it out, in addition to the fact that besides the benzol being nitrated, as is desired, other reactions as well take place. The third method, which is the one that is used most at the present time, is the absorption of the benzol and other hydrocarbons of the same group in paraffin oil.

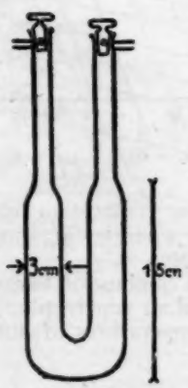
The Carbon-Absorption Method

The new method, which makes use of the absorptive powers of activated carbon for gases and vapors, is a decided improvement over all the older methods. Ths method is carried out in the following manner.

A U tube, as is seen in the accompanying diagram, which is provided with ground-glass stoppers and whose legs are lengthened and widened, is filled with thirty to forty grams of dry activated carbon. The stream of gas is passed through this tube at a velocity of 250 liters per hour. When the gas contains in round numbers twenty to twenty-five cubic centimeters of benzol hydrocarbons per cubic meter, about 200 to 300 liters of gas, measured in a gas meter, are passed through the tube, so that the entire process lasts about an hour. (In this case and in all other cases, except where it is specifically noted to the contrary the volumetric measurement of the benzol hydrocarbons refers to the condensed liquid and not to the gas. To convert these figures into cubic centimeters of vapor or gas, they must be multiplied by 252.3.) It is possible to reduce the time of the flow of gas through the apparatus, if particular care is taken to see that a longer column of activated carbon is used. Naturally, of those gases whose content of aromatic hydrocarbons is small, a larger volume is employed in the analysis.

After the absorption is completed, the U tube is connected with a condenser at the side where the gas leaves the apparatus. The condensate flows from the condenser to a burette, which is provided with a discharge cock. The U tube is placed in a bath of salt water and heated thereby to a temperature of 110 to 120 deg. Cent., and at the same time steam is blown through the apparatus. This is continued for about thirty minutes until the volume of benzol hydrocarbons in the burette no longer increases. From time to time a part of the condensed water vapor is allowed to flow out of the burette so as to keep the column of benzol within the graduated part of the burette. Inasmuch as the apparatus always holds back a certain quantity of the benzol, it is advisable to run a calibrating test on the apparatus with a known amount of benzol, absorb it in the activated carbon, distill the same by means of steam as above and measure the volume of benzol collected in the burette. The difference between the amount of benzol used and that recovered represents the benzol quivalent of the apparatus. This difference does not amount to much more than 0.2 c.c.

When the distillation with steam is concluded, the



U tube is connected with a water-jet vacuum pump. The external heating is continued, the steam generator is disconnected and the ground-glass stopper furthest away from the vacuum pump is closed. The water is then removed by evacuation and heating of the apparatus. It is more advisable to replace the glass stopper with a rubber stopper, through which there is stuck a thermometer which extends into the activated carbon. The drying process is then continued until this thermometer indicates the same temperature as that of the heating bath. The drying process lasts about half an hour. After cooling the absorption apparatus is ready for the next analysis.

This method gives good results and may be carried out in a comparatively short space of time. The aromatic hydrocarbons, which are recovered in this manner, may be treated with concentrated sulphuric acid and with lye or else subjected to a fractional distillation process to determine the various constituent parts.

Comparative Results

Tests were made with this apparatus on the illuminating gas produced in the Darmstadt gas works in Germany. The speed of the gas through the absorption apparatus was varied from 70 to 235 liters per hour without any appreciable variations in the results of the analysis. In these analysis two U tubes were used, one, a large one, being connected directly to the gas meter and the other, a small one, being connected after the large tube. Only about 10 per cent of the entire amount of benzol recovered in the analysis was absorbed in the small U tube.

To compare this method with the paraffin-oil method, the U tube, filled with activated carbon, was connected after the paraffin-oil absorption vessel and a known quantity of benzol vapor was passed through the apparatus. The paraffin oil absorbed from 50 to 53.5 per cent of the total amount of benzol passed through the apparatus, the remainder being absorbed by the activated carbon. Analyses of the Darmstadt illuminating gas, used above, were made by the paraffin-oil method, the dinitrobenzene method and the activated-carbon method. The first method gave only 9.74 to 10.1 c.c. of benzol per cubic meter of the gas, the second 16 to 17.2 c. c. of benzol, while the last gave 20.2 to 23.9 c.c. of benzol. The variation in the figures for each method represents the daily variation in the benzol content in the illuminating gas.

Scranton Company Has New Office Building

Splendid Structure Erected in Pennsylvania's Third Largest City

Scranton, the third largest city in Pennsylvania, occupies a very unique position in industrial and financial circles. Endowed with great wealth, it has enjoyed almost steady prosperity and has suffered very little from the panic and depressions that have affected the rest of the country.

The Scranton Gas & Water Company and its subsidiaries supply water to Scranton and some thirteen other cities and boroughs located to the north of Scranton in the Lackawanna Valley—and through the Hyde Park Gas Company and its subsidiaries gas is supplied to Scranton, Dunmore and Dickson.

For some fifty years the company occupied for its main office a building located at 115 Wyoming Avenue, Scranton. This building having become inadequate for the needs of the company, it was determined to build a new one and for this purpose a large plot of land was purchased on Jefferson Avenue in Scranton, directly opposite the Lackawanna Railroad station. In the center of this plot there has been erected a new office building seventy-five feet on the Jefferson Avenue front and ninety feet in depth and three stories high above the basement. The building erected as a memorial to the late W. W. Scranton, for many years president of the company, is probably one of the finest buildings of its kind in the United States and a splendid addition to the business structures of Scranton.

The exterior of the building is of Renaissance type of architecture, built of Indiana limestone with granite base. The building has a steel frame and is of fireproof construction. One of the marked features of it is the great amount of window space which has been provided for.

Marked by Simplicity

On entering the building one is impressed with the simplicity and dignity of the lines and decorations which together with the great amount of daylight, give the building a unique character. The entrance lobby has a marble floor and wainscoting with caen stone walls. On the wall facing the entrance a tablet has been placed bearing the following inscription:

Erected to the memory of W. W. Scranton, president of the Scranton Gas & Water Company from 1879-1916. To his foresight, energy and ability is due the water supply system of the city of Scranton and Lackawanna Valley.

To the left of the entrance lobby is the customers lobby, provided with benches, desks, etc., for the use of customers, and beyond it are the clerical offices. These are especially commodious and quiet, with cork floor and steel desk equipment throughout. To the rear is a steel vault twenty-five feet by twenty-two feet. A special feature has been made of the vaults in the building, there being another vault twenty-five feet by twenty-two feet in the basement and a large vault on the second floor for the use of the engineering department.

To the right of the entrance lobby is the gas appliance salesroom—a large room extending nearly the full length of the building. Here are kept for sale the lamps, fixtures, household ranges, etc., while another display room is provided in the basement for the industrial appliances, hotel equipment, etc.

All the fixtures in the building are of bronze furnished by Tiffany Studios and the large center fixtures are all lighted by the Welsbach magnetic system, controlled from buttons placed on panels in the wall.

On a mezzanine floor in the rear of the building are located the men's locker room and wash room. These are large, well-ventilated rooms, finished in white tile and equipped with lavatories, shower baths, etc.

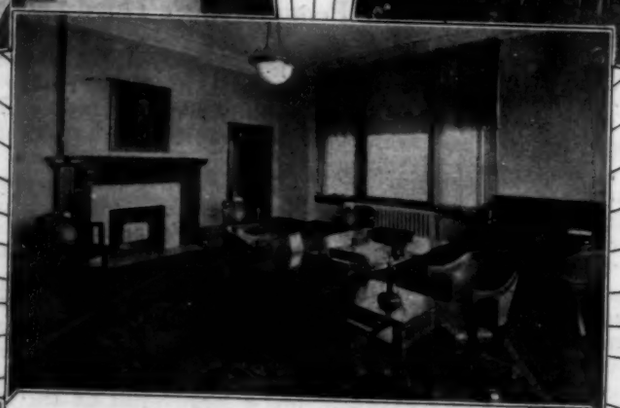
Executive Offices on Second Floor

On the second floor of the building are the executive offices of the company, the engineer's office and a large drafting room and vault for their use, laboratories where daily tests are made of all water and gas supplied, etc. On this floor also are the rooms devoted to the use of the women employees. Particular emphasis has been placed on the facilities for them, a wing of the building being reserved for their use, with locker room, large toilet room and rest room, furnished in an especially attractive manner for their use.

In the basement are located a recreation room, ma-

Views of New Building of Scranton Gas and Water Co.

Engineers Drafting Room



Womens Rest Room

President's Office

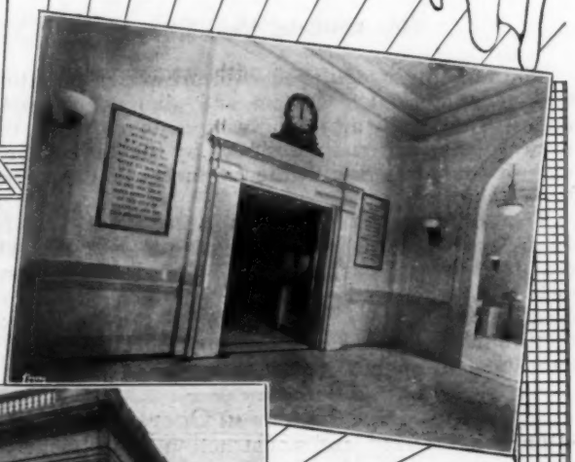
Business Office (Work Space)

Mechanical Room

Gas Appliance Display Room

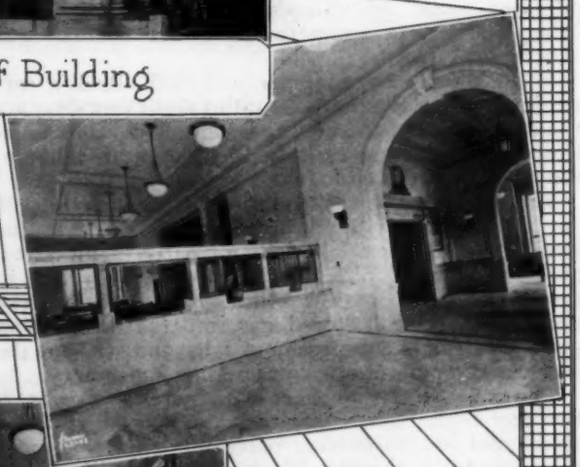
Further Views of Scranton Company's New Building

Main Entrance



Entrance Lobby

General View of Building



Entrance Lobby from Public Lobby

Gas Appliance Display Room

Public Lobby

chinery room, stock room and the printing department, where the bills of the company are printed. There has also been provided there a space for bowling alleys to be finished in the future.

The third floor of the building has not been finished, being reserved for future expansion

Has Artificial Ventilation

The building is equipped with artificial ventilation and vacuum cleaner system and all modern appliances. Practically all the lighting is done by gas, the fixtures being especially designed by the Tiffany Studios in conjunction with the engineers of the Welsbach Company.

The architects of the building were Messrs. E. H. Davis and G. M. D. Lewis, of Scranton, and the general contractor was Ludwig T. Stipp, of the same city. It is believed the building which they have erected will stand as a monument to the enterprises of the public service companies of Scranton, and a handsome addition to the architecture of that city.

New-Type Holder in Operation

The engineering and construction department of the Southern Counties Gas Company of California, operating in Los Angeles, Orange, San Bernardino, Ventura and Santa Barbara Counties of southern California, recently completed an entirely new type of storage holder in the city of Azusa.

The holder is located at the end of a transmission line some thirty-odd miles in length, the main originating in the heart of the Orange County gas fields. The newly completed equipment having passed through the recent cold "peak" period, its value was thoroughly proven in that the holder rendered the cities of Azusa and Glendora perfect service when other sections in southern California suffered gas shortages.

M. R. Thompson, engineer, and A. F. Bridge, rate engineer of the Southern Counties Gas Company, are the originators of the new type of holder. The function of the holder, as explained by Engineers Thompson and Bridge, is as follows:

The holder, with a capacity of more than 100,000 cu. ft., fills itself with gas from the transmission line during the "off peak" periods, or early in the afternoon and from ten o'clock at night until six o'clock in the morning. During the hours of heavy demand the holder delivers the stored gas into the distribution system. This is done automatically and without the services of operators or compressing machinery.

The tank is thirty-five feet in diameter and seventy-two feet high. The capacity is 107,000 cu. ft. The equipment has no moving parts and consists simply of an air-tight chamber thirty-five feet high and a superimposed water tank which is open at the top. The gas chamber is initially filled with water and when gas is admitted from the transmission line, the water is displaced and forced through connecting pipes to the water tank above. When the water is completely displaced, the lower chamber is filled with gas where it is stored under pressure equal to the statistic head of water. The reverse operation is true when the stored gas is withdrawn. Ordinary pressure regulators are employed on the inlet and outlet to shut off the supply when the holder is full and to govern the outlet pressure.

Engineers Thompson and Bridge are entirely satisfied with the operation of their new type of holder which from the first, according to their report, has been a success. In view of the comparatively small cost of construction and because there is little or no cost in operation, such equipment may be used with facility by gas companies wherever low-pressure conditions at peak periods are to be expected at the ends of high-pressure transmission and distributing systems.

Alaskan Coal Development

The Department of the Interior is perfecting plans for the operation of two coal mines in the Chickaloon district of Alaska, which have been under development by the navy and which have been turned over to the Interior Department. It is hoped to lease the mines to some responsible engineering or coal-mining company possessing the commercial experience and financial resources necessary to develop and operate the mines with a primary object of supplying coal for naval purposes. The detailed plans were discussed with a number of companies, and were definitely considered by four firms. Of these, the Lake & Export Corporation, of Huntington, W. Va., was the only one considering the prospects sufficiently good to warrant the expense of a preliminary field and engineering examination. Accordingly, the Department of the Interior has agreed with the Lake & Export Corporation to give that company until July 15 to complete an examination of the mines and possible markets and to make an offer to the secretary for the leasing and operation of the mines and marketing of the coal.

Making a Pipe-Flow Formula Easier to Use

By W. F. Schaphorst

No doubt most of the readers of this publication who have had to compute pipe sizes know that a commonly accepted formula for computing the friction loss in pipes is.

$$h = 0.38\ V^{1.86} \div d^{1.25}$$

where h = the loss on head in ft. per 1,000 ft. of pipe.
V = velocity of water in ft. per second;
d = diameter of pipe in ft.

This formula is a good one but at the same time it is rather difficult to use on account of the exponents 1.86 to 1.25. What is even worse, however, is the fact that the pipe diameter is given in "feet" rather than in inches. Most of us have trouble enough with plain logarithms, let alone cologs and other complications. So, to compute a one-inch pipe we first have to convert the inches to feet, which is usually less than one, and to find the logarithm of a number less than one is apt to confuse.

The writer has therefore converted the formula into more usable form as follows:

$$h = 8.47\ V^{1.86} \div d^{1.25}$$

where the factors are all the same as named above with the exception that d equals diameter of pipe in inches.

As the Journal Views It

Removal Notice

The "American Gas Journal" is now located in the Dodge Building, 53 Park Place, New York City. Our new telephone number is Barclay 6736.

The Bacharach Bill

The Bacharach bill, which the judiciary committee of Congress has been considering for some time, is probably one of the most vicious bills that have ever been introduced; and while authorities seem to agree that even if it were passed and became a law it would be declared unconstitutional, at the same time it is indicative of a certain trend of mind of some of our legislators. Briefly the bill, according to the objects announced by its sponsor, Representative Bacharach of New Jersey, seeks to take from Federal district and circuit court judges the jurisdiction to fix rates for utility corporations doing only an interstate business. Its sponsor, in seeking support for the measure, declares that the Federal courts have exercised the functions of various municipal authorities in some cases and of public utility commissions in other cases in the right to fix rates that a utility shall receive for its services. We are of the belief that Mr. Bacharach is laboring under a misapprehension, for we do not know of any Federal court decision in which rates have been fixed. In some cases they have temporarily stated that a certain sum should be received by a company for its service; but usually the decisions, so far as we know, have been to declare a current rate confiscatory or unconstitutional, and have referred back the matter of a new equitable rate to the proper authorities.

Under the Bacharach bill, cases could not be brought before Federal courts except where a security holder resided in another State whose courts would have no jurisdiction over a utility.

There has been a great deal of opposition to the bill on the part of many people, including representatives of the American Bar Association, who have stated through their E. A. Harriman, of Washington, D. C., that, in the judgment of the officers of that association, the changes proposed by the bill would be contrary to public welfare. There are many inaccuracies in the bill as drawn, and withal it is undoubtedly a measure that was prepared in response to a certain kind of public clamor.

We understand that the American Gas Association has had a committee appear before the House committee in opposition to this bill, although we have no direct information to this effect. We hope that the members of the American Gas Association, as well as those companies that are not thus represented, will support all possible opposition to this measure, and also that they will get in touch with their representatives in Congress and point out wherein they believe the Bacharach bill to be wrong.

We believe that the bill can best be sized up when it is stated that it is the kind of bill that elicits the support of Mayor Hylan of New York. Those who are familiar with his actions in public utilities will be able to understand clearly what is meant.

The Company Offices

The question of proper housing for a gas company is a most important one, and one which is very directly connected with the standing of the company in its community. It is a known fact that on the surroundings of the company depends greatly the attitude which its public take toward it.

In another part of this issue of the AMERICAN GAS JOURNAL will be found a description of and photographs showing the new building of the Scranton Gas & Water Company, of Scranton, Pa. This is one of the most splendid types of office building that we have encountered and we feel safe in saying that the residents of that thriving Pennsylvania city will point to it with a great deal of pride. This is the sort of thing that will arouse within the consumers a feeling that the company is attempting to aid in building up the community and also that it is one of the foremost industries of the section. Because we feel that this is an important part of the industry, we have devoted considerable space to it.

Graphic Charts of Gas Generator Operation

(*Continued from page* 439.)

care of the various conditions of the individual plant, while for metallurgical furnaces the most importance is attached to the highest attainable combustion temperature. In large gas engine plants the recovery of by-products is most important for the economical operation of the plant. This is the deciding factor in selecting the gas. This can be attained by using the right combination of generator gas, as the percentage of tar vapor from which the by-products are derived is produced in the distilling zone, depending entirely on the temperature maintained in this zone. This depends again on the amount of steam used and on the height of the fuel bed. Therefore it can be said that all these conditions can be shown and plotted in the triangle chart, as all the possible gas combinations are inside the generator gas trapez which show the relation of gas and useful by-products. As, for example, if one wants to know the gas combination and useful by-products from a fuel as shown in Table I, one plots the curves as shown in Fig. 6 and finds that the four gasification processes have almost the same thermochemical degree of efficiency of approximately 73 per cent. It further shows that the process near the upper left-hand corner is not economical when by-products are recovered in form of tar and ammonium sulphate. While gas processes found to be located in the lower right-hand corner indicate that when using the same fuel the most ammonium sulphate can be recovered, economical gas processes located near the middle of the chart show the largest economical possible recovery of tar.

After one has decided on the quality of gas to be used, the diagram (Fig. 3) of equal volumes will offer a means of checking the gas analysis and the accuracy under operating conditions. If one could be sure of the hand analysis, the location of the point representing the gas combination could easily be determined in the gas trapez and the results obtained will be accurate enough for operating conditions.

If there existed an automatic indicator showing the exact H_2 contents of the gas, then in connection with automatic CO_2 recording instruments, a hand analysis would be unnecessary.

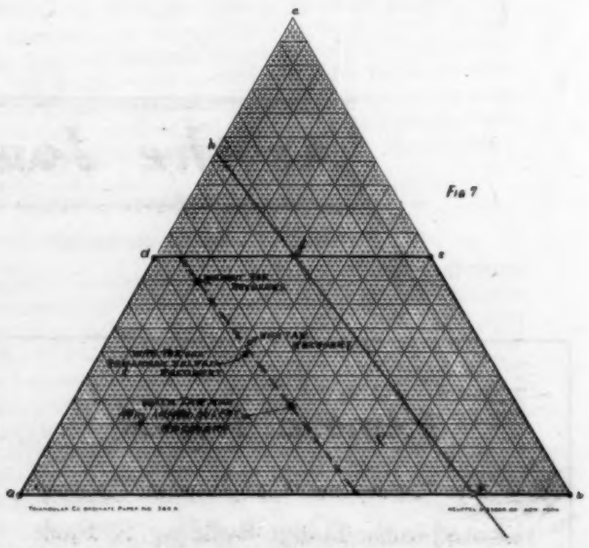
The lines representing CO are not very suitable for this purpose, as the intersecting angle with the CO_2 lines is too small to give exact results.

If the produced gas varies in quality from the gas desired, the operation of the generator has to be adjusted to produce the desired quality. Four changes in operation are possible: (1) Variation in amount of steam supplied; (2) variation in amount of blast air supplied; (3) variation in height of fuel bed in gasification zone; (4) variation in load of generator.

TABLE I

Semi-Bituminous Coal of 78.8 Per Cent C, 5.71 Per Cent H_2, 9.59 Per Cent O_2

Volume %	Without By-product	With Recovery of Tar	With Tar and 20 k. Am. Sul. Recovery	With Tar and 40 k. Am. Sul. Recovery
CO	29.0	18.2	14.6	9.5
CO_2	3.0	10.0	12.6	16.5
H_2	8.5	18.0	19.4	25.0
CH_4	2.5	2.4	2.4	2.4
N	57.0	52.4	51.0	46.6



Increased steam supply changes the position of the point representing the gas in the gas trapez toward the water-gas corner, but precaution must be taken that the neutral calometric line f is not reached, otherwise the generator would run cold and gas production cease. When the steam supply is reduced and the loss in pressure is made up by additional blast air, assuming the same load condition, it would have the tendency of shifting the point toward mixed gas corner (Fig. 1).

Increasing the height of the fuel bed lowers the point; reducing the height of fuel bed will raise the point. From experiments it has been shown that increasing the load raises the point, while decreasing the load the point will be lowered.

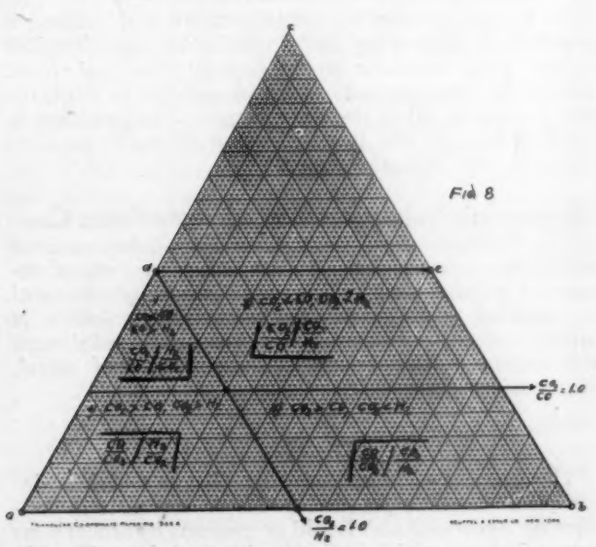
Ostwald's graphic means of showing the gasification process will enable the investigators to find additional information pertaining to the complicated gasification process. It is remarkable how plainly the graphic chart shows the deviation of the gas phase into the free gas space above the fuel bed. Newman explains this phenomenon in a later study based on former tests. From another test made by Newman with a gas generator of 470 mm. inside diameter, the results obtained were plotted in a gas trapez. The terminal gas of the three tests and the gas combination of the different zones of first row of the second column are plotted in Fig. 5. It may be noted, the great simplicity in showing the various operating conditions and the shifting of the gas phases in the free gas space of the generator. Newman explains that the shifting is due to the different quality of the gases as formed near the walls of the generator and the center part of the fuel bed. One can readily see that this will offset the effect of extremely high fuel beds; and it shows further that this is a very deciding factor in the efficiency of gasification process. When comparing the operating condition under which Newman's tests have been made with the graphical chart plotted according to the tests (Fig. 7), one finds that the above-mentioned condition has been verified. The tests further show that at a uniform load of the generator, equal amounts of fuel per generator area, are forming approximately a straight line. One can deduct from this that for the same generator areas and uniform load not all

gas combinations can be produced, regardless of the possible change in air and steam supply. All these reactions are forming a straight line which, in case of coke gas, runs parallel to a line representing air gas and hydrogen reaction, because automatically blast air velocity and the heights of the glowing fuel bed (gasification zone) equal each other. Further, on hand of Ostwald's gasification chart additional information may be gained of the advisability of adding CO_2 to generator operation, as has been again proposed by Gwodz, for continuous operation of the generator. The operation must remain exothermic and can only be operated when its gasification point remains inside of triangle a. j, h (Fig. 1).

Point a (theoretical air gas reaction), as the one farthest away from the neutral calometric line, represents approximately 74 per cent efficiency of the gasification process. On account of the change in position of the gas phase in the free gas space of the generator, and on account of terminal temperature and the unavoidable loss due to radiation, no higher efficiencies are obtainable. Efficiencies of 70 to 74 per cent were easily attained without any additional steam in all tests.

It is correct that the gas output is increased by the addition of CO_2 from waste heat gases, but it also can be shown that it is caused solely by the enrichment of the gases through the nitrogen, which represents a dilution of the combustible elements of the gas, lowering the combustion temperature. Attention may be called to the possibility of using the gas trapez to define exactly the final gas or to create a universal system of gas generator operation. The most suitable chart would be Fig. 3, instead of using the present indefinite method of determining gas, as, for instance, coke gas, mixed gas from lignite, etc., which does not signify anything in regard to quality of the gas.

For the proposed system a simple symbol may be selected to designate a gas, its exact combination, its characteristics and, in addition, the source from which it is produced. The position of any gas in the gas trapez is determined by only two constituents; and as the ratios of $CO_2 \div CO$, or $CO \div CO_2$, or $CO_2 \div H_2$, or $H_2 \div CO_2$ give the most accurate results, it is advisable to use these elements as standard units for generator gas. The manner and way this should be done is a subject to be decided by the various interested organizations. In any case, the gas can be designated by those two constituents, as in all cases CO_2 is present. All one has to show is that CO_2 is larger or smaller, as $CO - H_2$, or give the position of the gas in the gas trapez, which would give the same designation.



The trapez is divided into four parts through the lines. When $CO_2 \div H_2 = 1$ and $CO_2 \div CO = 1$ (Fig. 8), in field 1 are located all gases whose symbols are $CO < CO$ and $CO_2 > H_2$; in field 2 are $CO_2 < CO$ and $CO_2 < H_2$; in field 3, $CO_2 > CO$ and $CO_2 < H_2$; in field 4 are ratios of $CO_2 > CO$ and $CO_2 > H_2$. By adding an angle symbol all necessary designations for any gases are given and one can immediately locate the point representing the gas in the trapez. The above can best be explained on hand of a few examples:

(1) Air gas from coke: 5.8 per cent CO_2, 23.6 per cent CO, 1.9 per cent H_2.

$CO_2 < CO = CO_2 \div CO = 5.8 \div 23.6 = 0.25$
$CO_2 > H_2 = H_2 \div CO_2 = 1.9 \div 5.8 = 0.33$

Point 1 (Fig. 3):

Symbol: 0.25/0.33/ coke.
To read: 0.25 to 0.33 upper left.

(2) Mixed gas from coke: 6.3 per cent CO_2, 25.6 per cent CO, 12.8 per cent H_2.

$CO_2 < CO = CO_2 \div CO = 6.3 \div 25.6 = 0.25$
$CO_2 < H_2 = CO_2 \div CO = 6.3 \div 12.6 = 0.50$

Point 2 (Fig. 3):

Symbol: /0.25/0.5 coke.
To read: 0.25 to 0.5 upper right.

(3) Mixed gas from semi-bituminous coal: 16.5 per cent CO_2, 9.5 per cent CO, 25 per cent H_2.

$CO_2 > CO = CO \div CO_2 = 9.5 \div 16.5 = 0.52$
$CO_2 < H_2 = CO_2 \div H_2 = 16.5 \div 25.0 = 0.66$

Point 3 (Fig. 3):

Symbol: /0.52/0.60 semi-bit. coal.
To read: 0.52 to 0.60 lower right semi-bit. coal.

(4) Mond gas from lignite under poor operating conditions: 16 per cent CO_2, 10.3 per cent CO, 12.5 per cent H_2.

$CO_2 > CO = CO \div CO_2 = 10.3 \div 16.0 = 0.64$
$CO_2 > H_2 = H_2 \div CO_2 = 12.0 \div 16.0 = 0.75$

Point 4 (Fig. 3):

Symbol: 0.64/0.75/ lignite.
To read: 0.64 to 0.75 lower left lignite.

Bibliography: Zeitschrift, V, D, I.; 1914, page 42; 1920, page 860; 1921, page 45; 1921, page 769. Feuerungs Technik, 1921, page 73. Mitt. U. Forsch-Arbeiten-Heft, page 140. Monographien Zur Feuerungs Technik-Heft, page 2.

Developments of Gas Technology

Important Information Gathered from All Parts of the World

By ISMAR GINSBERG, B.Sc., Chem. Eng., Associate Editor

Coal Carbonization

The raw materials which are used in this process, such as lignite, brown coal and peat, are first dried and then powdered and mixed with a liquid such as coal-tar creosote, so as to form a paste. This paste is then ground and mixed with coal tar, coal-tar fractions of the heavier grades or other suitable hydrocarbons, to form a liquid mixture. In case the raw materials have an acid reaction, lime or other alkali is added at this stage of the process. The liquid is then passed under pressure through heated pipe of small diameter at a high speed. The purpose of the pressure is to prevent the evolution of gas during the course of this treatment, and to accomplish the same, the pressure is maintained at any point up to twenty-five atmospheres. The temperature is kept at about 500 deg. Cent. The liquid is then introduced into a chamber in which the liquid portion of the same is vaporized and partially cracked, and then the vapors, which are produced in this manner, pass into a condenser where the low-boiling hydrocarbons and ammonia are separated from the permanent gases. The liquid residue is then subjected to a process of fractionation, whereby there are obtained motor fuel, solvent naphtha, illuminating and lubricating oils, etc. On further heating heavy oils are recovered and the pitchy residue may be formed into briquettes, which are then distilled to yield gas oil, ammonia and hard coke. (British Patent 175,670.)

Hard Coke from Soft Coal

The coke that is obtained from a highly bituminous coal by coking at the regular temperature—600 deg. Cent.—is soft and porous and is liable to disintegrate. Binders, such as pitch, or mechanical compression, are sometimes used to overcome this disadvantage. The process, patented in British Patent No. 175,888, will yield a hard, dense coke without the use of binding agents or mechanical force. This is accomplished by first preheating the coal and then crushing and finally carbonizing it at a temperature preferably not over 500 deg. Cent. All the bituminous matter is removed in this manner and a porous coke is obtained. The product is then passed through a furnace which is heated to a temperature of 600 to 1,000 deg. Cent., which serves to remove all the volatile matter and yields a smokeless fuel. The preheating is effected at a temperature of 350 deg. for 1.75 hr. with the coal in a thin bed. The loss in weight amounts to 10 per cent. The next step is to crush the coal and heat to a temperature of 480 deg. Cent. with the formation of coke and the distillation of oil. Then this coke is heated for 1.5 hr. at 900 deg. Cent. to yield metallurgical coke, with oils and ammonia as by-products.

Experimentation revealed the fact that coke is formed at temperatures of 350 to 500 deg. Cent. and that some coals of a very high volatile content, which do not usually form coke, can be caused to do so if they are preheated so as to leave 5 to 6 per cent of the resinous matter behind in the coal. The temperature at which the coking is carried out will determine the grade of the by-products recovered and their possible applications, whether as substitutes for the natural petroleum products or for use as fuel. The process may be carried out by feeding the material onto trays which form an endless chain extending around an oven heated by flues. After their passage through the oven the trays discharge their contents through a shoot into a retort in which the coke is heated to a higher temperature.

Maclaurin Coke Process

In this process the hot gases, produced in a small built-in producer, are used to degasify the coal in a large shaft furnace to produce therefrom a smokeless fuel. No other heat is required for this process. The oils that are obtained as by-products are highly complicated bodies which are decomposed again in the heating process. Further details regarding this process may be obtained from the original article in the Gas Journal, 155, page 387.

Coke as Fuel for Heating Water

This subject is discussed very thoroughly in the article, appearing in the **Gas Journal**, 155, page 543, which also contains the results of various tests which were run with different makes of steam boilers and different kinds of coke. It was determined that the efficiency of the operation depended but little on the nature of the coke, but much more on the conditions within the combustion chamber.

Compressed Metallurgical Coke

In French Patent No. 524,612 there is described a method of improving the qualities of metallurgical coke. This consists in subjecting the coal from which the coke is made to either sudden or continuous pressure within the coke retort. The pressure is applied first in the hot state and then in the cold state, or else in both conditions.

Removing Sulphureted Hydrogen from Gas

The Badische Anilin und Soda Fabrik has secured a German patent (No. 348 409) on a process of removing sulphureted hydrogen from gas by means of an alkaline iron oxide solution. This solution is mixed with other solutions which are obtained during the course of the destructive distillation of wood, straw and the like.

Oil Gas

The process of manufacturing oil gas which is described in German patent No. 346,637 consists in conducting hydrogen and liquid or gaseous hydrocarbons into a furnace which is lined with firebrick. To this

mixture there is added a liquid hydrocarbon of high specific gravity and the three substances are subjected to the action of heat so that the hydrocarbon is decomposed and the gaseous products, derived therefrom, form with the hydrogen a gas of proper composition. The free carbon which is formed during this process and is contained in the oil gas is washed out of the same in suitable washers.

Notes of Investigations of U. S. Bureau of Mines

Effect of Back Pressure on Oil Production

In the study of the effect of regulated back pressure on oil production, the Bureau of Mines has found that wells being produced under several pounds back pressure are not declining as rapidly as other wells in the field. This investigation is of especial interest, as if it can be demonstrated that pressures up to ten to fifteen pounds can be carried on the wells without affecting the production, it will result in saving large quantities of gas now wasted, by producing the wells at atmospheric pressure.

Study of Skimming-Plant Operations

In the investigation of skimming-plant operations, being made by M. P. Youker, refinery engineer, of the Bureau of Mines, visits have been made to a number of refineries in Oklahoma and Texas for the collection of information on amounts of fuel consumed for various refinery operations, temperature of flue gases, amount of steam, etc. Arrangements have been made with a number of refiners to install equipment for determining the efficiency of skimming-plant equipment, and Mr. Youker will then spend several days at each plant measuring the fuel used for various operations and the amount and character of the distillates recovered.

Toxic Gases from High-Sulphur Crude

A study of gases from crude oils containing high percentages of sulphur has been begun by the Bureau of Mines. Light Mexican crude oils have been obtained and samples of gas taken which were found to be toxic. The work so far indicates that this is a very important problem and one of far-reaching effects.

Government Oil Royalties

In the month of March, 1922, the total net royalty accruing to the United States Government for reports on oil and gas production on leased public lands under the supervision of the Bureau of Mines amounted to $661,725.37. Of this amount, $405,000 is credited to Wyoming, $200,000 to California and $55,000 to Montana. The total net Government royalties to date, as shown by reports submitted by the Bureau of Mines to the General Land Office, amount to $3,641,278.95.

Operations in Salt Creek Field, Wyo.

In connection with the supervision by the Bureau of Mines of oil and gas producing operations on leased public lands in the Salt Creek field in Wyoming, a repair company has been planned. The various companies operating in that field are arranging to place drilling machines and mudding and cementing outfits in the field. The fuel-gas situation in this field has been settled by permitting the lessee to furnish the field fuel line 50,000 cu. ft. of gas daily for home camp purposes and charging royalty on all gas delivered above this quantity from each lease.

R. V. Mills, petroleum technologist of the Bureau of Mines, is making a study of the protection of oil and gas well equipment against corrosion.

Indiana Shales

Good progress has been made in a survey of the oil-shale resources of the State of Indiana, a preliminary step in the co-operative work on Indiana shales to be done by the Bureau of Mines and the Department of Geology of Indiana University at Bloomington, Ind.

Anthracene

Anthracene is not usually produced in small tar works except as it exists in the anthracene-oil fraction obtained in distilling tar, according to W. W. Odell, fuel engineer of the Bureau of Mines, in Technical Paper 268, just issued. In such plants it is common practice to include this fraction with the creosote fraction, thereby enhancing the value of the latter as a wood preservative.

The crude product is obtained by cooling the anthracene-oil fraction and allowing the solids to separate and the oil to drain off. After the oil is drained from the solids, the latter are bagged and pressed or "whizzed" (centrifuged) to expel the oil still retained with the solids. This crude anthracene is usually sold as such. It amounts to about 5 or 10 per cent of the total distillate fraction from which it was obtained and contains approximately 15 to 35 per cent of anthracene. Different tars yield different amounts of anthracene. To purify the crude product further, it is either ground and agitated with hot solvent naphtha and drained, or is washed in a whizzing process with solvent naphtha. The dried product made in either way contains approximately 70 to 80 per cent of anthracene.

A high-grade commercial anthracene is sometimes prepared by redistilling the crude anthracene oil obtained in the distillation of tar and separating a fraction that includes the distillate with a specific gravity of approximately 1.25 to 1.30 at 60 deg. Fahr. This fraction is cooled, drained of oil, pressed and washed, and sometimes sublimed. The sublimation process is like that employed for purifying naphthalene except that the inclosed anthracene pans are heated by direct fire and superheated steam is blown directly on the melted anthracene and a water spray is used to condense the product. The commercial grade of anthracene is known as 80 per cent anthracene. Its further treatment is left to the alizarin works or other chemical plants

Public Utilities Securities Market Report

Prices of Representative Gas Bonds

(Quotations furnished by The National City Company)

Company	Issue	Maturity	May 11, 1922 Bid	Asked
American Lt. & Trac. Co.	Five Year 6s	May 1, 1925	106	106½
Brooklyn Union Gas Co.	First Consol. 5s	May 1, 1945	94¼	96
Columbia Gas & Elec. Co.	First 5s	May 1, 1927	93½	94½
Consol. Gas, Elec. Lt. & Pr. Co. of Baltimore	First Ref. 7½s	Dec. 1, 1945	109½	110
Consol. Gas, Elec. Lt. & Pr. Co.	General 4½s	Feb. 14, 1935	90	91
Consol. Gas Co. of New York	Sec. Conv. 7s	Feb. 1, 1925	116½	117
New Amsterdam Gas Co.	First Consol. 5s	Jan. 1, 1948	80	81
Denver Gas & Elec. Co.	Gen. (now 1st) 5s	May 1, 1949	91	93
Detroit City Gas Co.	Gold 5s	Jan. 1, 1923	99	100
Equitable Illum. Gas Lt. Co. of Philadelphia	First 5s	Jan. 1, 1928	98¾	99¾
Hudson County Gas Co.	First 5s	Nov. 1, 1949	88	90
Laclede Gas Light Co.	Ref. & Ext. 5s	Apr. 1, 1934	90⅞	92
Louisville Gas & Elec. Co.	First & Ref. 7s	June 1, 1923	100	101
Michigan Light Co.	First & Ref. 5s	Mar. 1, 1946	88	90
Milwaukee Gas Light Co.	First 4s	May 1, 1927	92¾	93
Pacific Gas & Elec. Co.	Gen. & Ref. 5s	Jan. 1, 1942	91½	92½
Pacific Gas & Elec. Co.	First & Ref. 7s	Dec. 1, 1940	106	107½
Cal. Gas & Elec. Corp.	Unif. & Ref. 5s	Nov. 1, 1937	95⅜	95¾
Peoples' Gas Lt. & Coke Co.	Refunding 5s	Sept. 1, 1947	91	91¾
Chicago Gas Lt. & Coke Co.	First 5s	July 1, 1937	95	—
Portland Gas & Coke Co.	First & Ref. 5s	Jan. 1, 1940	89½	92
Seattle Lighting Co.	Refunding 5s	Oct. 1, 1949	85¾	86¾
Southern California Gas Co.	First 6s	Nov. 1, 1950	96	98
Utica Gas & Electric Co.	Ref. & Ext. 5s	July 1, 1957	87	89
Washington Gas Light Co.	General 5s	Nov. 1, 1960	94	—
Western States Gas & Elec. Co. of California	First & Ref. 5s	June 1, 1941	88½	89½

Brooklyn Union Gas Plans $11,347,000 Bond Issue

Brooklyn, N. Y.—The Brooklyn Union Gas Company, in a letter addressed to its stockholders, has announced plans for new financing adopted by the directors and largely in the nature of reimbursing the treasury of the company and its subsidiaries for capital expenditures during recent years. The financing will take the form of bond issues aggregating $11,579,000. Of this sum, $6,000,000 will be first lien and refunding bonds, bearing 6 per cent interest, and the remainder, $5,579,000, will be 7 per cent convertible debentures. In addition, the stockholders were asked to vote an increase in the authorized capital stock of the Brooklyn from $20,000,000 to $30,000,000. The additional stock will not be issued at this time, but only as required for the conversion of the debentures and for future expansion of the company's plant. At the present time the amount of capital stock outstanding is $18,000,000.

The Brooklyn Union Company found it necessary during the war period to increase its floating debt $4.300,000. In the ten years from 1911 to 1921 more than $8,000,000 was expended for additions to plant and improvements. For these expenditures the treasury has been reimbursed only to the extent of $2,000,000 by the issue of 7 per cent debentures.

The total outstanding capitalization of the company, after the new financing is accomplished, will be as follows:

Old Issues—	
Capital stock	$18,000,000
First mtg. 5% bonds	15,000,000
Con. 7% debentures	2,000,000
New Issues—	
First lien and refunding bonds	6,000,000
New convertible debentures	5,579,000
Total	$46,579,000

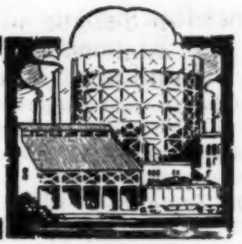
In the same ten-year period the subsidiaries of the company, including the Flatbush Gas Company, the Newtown Gas Company and the Jamaica and Woodhaven Gas Light companies expended $5,347,000—money advanced by the Brooklyn Union. For the funding and capitalization of these expenditures, it is proposed to have the subsidiary companies issue first mortgage bonds to the total of $5,347,000, divided as follows: Flatbush Gas, $2,900,000; Newtown Gas, $1,749,000; Jamaica, $360,000; Woodhaven, $329,000.

"Part of the proceeds of the issue of $6,000,000 first lien and refunding mortgage bonds of the Brooklyn Union," says the letter to the stockholders, "will be used to purchase from the subsidiary companies the above-mentioned bonds, which bonds will be pledged under the first lien and refunding mortgage of the Brooklyn Union Gas Company. The funds thus obtained by the subsidiary companies will enable them to pay off their obligations and also to make a substantial payment toward their indebtedness to the Brooklyn Union Gas Company."

The new financing is recommended to the stockholders, who are called to meet and act on the plan on Friday, May 19. Meanwhile application has been made to the Public Service Commission for approval

(*Continued on page* 20.)

NEWS OF THE GAS INDUSTRY



Indiana Gas Men Hold Annual Meeting at Westbaden

Report on Rate Situation Most Important Topic at Convention

The Indiana Gas Association held its annual meeting at Westbaden, Ind., May 8, 9 and 10. A large and enthusiastic attendance helped to make this one of the most successful meetings ever held in Indiana.

The important topic at the convention was a report, framed by a committee of gasmen, on a new standard for rate structure, which was published in the April 29 issue of the JOURNAL.

A special program arranged for the wives of members included a most enjoyable automobile trip to points of interest in the French Lick Valley. A golf tournament on the French Lick course held the attention of the men.

At the annual banquet, which was held on Monday evening, Louis Stotz, assistant secretary-manager of the American Gas Association, was the principal speaker.

Among the addresses were those of Richard M. McClure, of Chicago, secretary of the Department of Service of the International Association of Rotary Clubs; E. R. Lewis, of Detroit branch of the Ruud Manufacturing Company; Louis Stotz, of New York; M. D. Van Amburgh, editor of *Silent Partner;* F. A. Weaver, sales manager of the Tappan Stove Company, Mansfield, Ohio, and Harry Newman Tolles, president of the Sheldon School, Chicago. Discussions of various gas appliances took up much of the meeting. The program was as follows:

MONDAY MORNING

President's Address — Morse Dellplaine, Hammond, Ind.
Report of Secretary-Treasurer—E. J. Burke. Indianapolis.
Reports of Standing Committees.
Appointment of Nominating Committee.
Address, "The One Thing to Remember in Selling"—Richard M. McClure. Secretary Department of Service, the International Association of Rotary Clubs, Chicago, Ill.
Paper, "Selling Automatic Water Heaters"—George T. Baker, Ruud Manufacturing Company, Pittsburgh, Pa.

MONDAY EVENING

Annual Dinner.
Address — Louis Stotz, Assistant Secretary-Manager American Gas Association, New York City.
Address, "How to Fail"—F. D. Van Amburgh, Editor *Silent Partner,* New York City.

TUESDAY MORNING

Report of Special Rate Committee—B. H. Gardner, Lafayette, Ind.
Address, "Selling Gas Ranges"—F. A. Weaver, Sales Manager Tappan Stove Company, Mansfield, Ohio.
Address, "Ann Aliza"—Harry Newman Tolles, President Sheldon School, Chicago, Ill.
Election of Officers.
Adjournment.

Held Gas-Range Week

Rochester, N. Y.—Kennedy & Co., 22 South Avenue, recently held a gas-range demonstration week and presented to each buyer of Dangler gas range a "Wear Ever" three-piece aluminum steamer, retail value $7.50. The Lorain oven-heat regulator was featured in the campaign.

Purifiers for Marshalltown, Iowa

The Iowa Railway & Light Company, of Cedar Rapids, Iowa, has recently placed their contract for a new purifier box for the plant at Marshalltown.

The new box, together with its auxiliary parts, will be furnished and erected by the Western Gas Construction Company.

Tar Extractor at Albuquerque, N. M.

Contract has recently been placed by the Albuquerque Gas & Electric Company, of Albuquerque, N. M., which is controlled by the Federal Light & Traction Company, of New York City, for a tar extractor and by-pass for their plant.

The new machinery is being furnished them by the Western Gas Construction Company.

Rebuilding Gas Holder

Extensive repairs to the 500,000 cu. ft. gas holder at the plant of the Lincoln Gas & Electric Company, of Lincoln, Neb., have been authorized, and contract has been placed with the Western Gas Construction Company to furnish the parts and take charge of the erection work.

Increased Capitalization

Lockport, N. Y.—The Middleport Gas & Electric Light Company has filed papers in the Niagara County clerk's office, increasing the company's capitalization from $50,000 to $60,000.

American Society of Mechanical Engineers in Convention at Atlanta

Atlanta, Ga.—Impetus is expected to be given industry in the South by the annual convention of the American Society of Mechanical Engineers, which convened Monday morning, May 8, in Atlanta with 500 leaders of the profession attending. While not the largest gathering numerically that Atlanta has entertained this year, the largest investment of capital ever brought together through industrial representatives in the South discussed the problem of modern mechanics. The convention closed Friday.

A special feature of the convention was the original model of Eli Whitney's cotton gin. The engineers considered it particularly appropriate to bring this original of the greatest invention of the century to the center of the cotton belt where it has done the most good.

Visiting engineers visited leading hydroelectric developments in Atlanta territory, such a Tallulah Falls and Muscle Shoals.

It is understood that many New England cotton-mill manufacturers, spurred by strikes fomented by foreign labor, are contemplating moving their establishments to the South and will depend largely upon the advice of their engineers, who were here for the convention.

The Atlanta section of the engineers' society prepared a program of lavish entertainment, as well as one that will familiarize the delegates with the undeveloped resources of the South, and the opportunities it offers to prospective industries. Committees were organized among all affiliated technical societies of Atlanta to attend to all details of entertainment and various civic bodies were helping to make the convention a success.

Committees and their chairmen were as follows: General committee, H. E. Bussey, chairman of the Atlanta section of the American Society of Mechanical Engineers; entertainment, N. C. Harrison; professional programs, E. A. Brooks; hotels, W. J. Neville; automobiles, W. H. Holby; hotel information booth, Prof. R. S. King; hospitality, Adam W. Jones.

Piedmont Hotel was convention headquarters, with the main sessions being held in the hotel convention hall and smaller sessions being held in various small meeting halls.

The social program included a dinner at the Piedmont Hotel Monday evening, an automobile tour Tuesday afternoon, a dinner dance on the Hotel Ansley roof garden Tuesday evening, a barbecue and golf match at East Lake Club Wednesday afternoon, and a theater party at the Howard Thursday afternoon.

Engineers specializing in mechanical practice held special sessions. There also were special sessions for faculties of engineering schools. The entire field of mechanical engineering was covered by various submeetings. The first delegation to arrive was from New York. About fifty engineers from that city came in Sunday.

The Chamber of Commerce volunteered the use of members' automobiles for the visitors and local golf clubs extended to the engineers the privileges of their homes.

Directors of the Atlanta Gas Light Company, of which Preston S. Arkwright is president, were busy entertaining the gas engineers and arranging special sessions for professionals in that line.

New Units in Operation

Rochester, N. Y.—The new plant addition to the gas manufacturing works of the Rochester Gas & Electric Corporation that has recently been completed in Falls Street, at a cost of about $425,000, was lately operated for the first time.

The use and operation of these new units increases the plant's capacity 1,500,000 cu. ft. per day and the additional amount of coke produced will equal nearly 100,000 tons per year.

Natural Gas Discovered in Test Wells

Troy, Pa.—The Bradford County Oil & Coal Corporation, of Troy, Pa., has discovered natural gas in test wells brought in on the Robert Connor farm on Armenia Mountain.

President George D. Curran, of Elmira, N. Y., states extensive preparations are under way for complete testing of more than 10,000 acres already under lease.

In the wells brought in to date, there have been strong indications of excellent grade of oil.

C. H. Quackenbush Presented with Loving Cup by Gas Employees

East St. Louis, Ill.—When C. H. Quackenbush, manager of the St. Clair County Gas & Electric Company, returned to his desk after an absence of several days, during which the formal transfer of this company to the Southern Illinois Light & Power Company was completed, he was greeted by a surprise in the form of a handsome silver loving cup, which was presented to him by employees of his company who have served five years or more under him.

There was no presentation speech or other formality. A beautifully engrossed letter of presentation on parchment, written and designed by William H. Matlack, who has been in charge of the company's institutional advertising, reposed in the cup, and this told the story of appreciation and gave expression of the good-will of Mr. Quackenbush's associates in the local company. This letter reads:

"The following employees of record, of five years or more, of the St. Clair County Gas & Electric Company, on this third day of May, nineteen hundred and twenty-two, hereby make record of the profound appreciation of Charles Howard Quackenbush as a man and leader of men, a man of vision and sincerity, a just and considerate employer, a leader fearless and persevering, a leader wise and resourceful.

"He has ever been alert to promote harmony and co-operation throughout the organization.

"It is a privilege to have known and been associated with him, and we wish him Godspeed in his new undertakings.

"We hereby present this token of our appreciation, friendship and good-wishes to Mr. Quackenbush.

"Signed: Marie Bailey, Adele Berkmeyer, H. Buhs, F. Casey, J. J. Dengler, A. S. Edmiston, C. A. Fowler, Lottie Graebe, L. F. Graf, Wm. Grimm, J. R. Hoffman, H. P. Hohnadell, A. S. Kneipkamp, F. Landmann, J. R. Orton, T. F. Powers, Ruby Raine, H. Rhein, S. C. Schmulbach, Etta Schwarz, J. J. Tayon, E. G. Wangelin, I. H. Watson, C. J. Wilson."

Classification of Land

What should prove of interest to everybody holding land now, or intending to purchase for "specific purposes," is the case of D. P. Clements vs. T. J. Robinson, State Land Commissioner et al. of the State of Texas, a writ of mandamus being sought. The land in question was one section situated in Reeves County, which was classified originally as "dry grazing" and sold at $1 an acre to H. W. Case. Case, it is claimed, did not pretend to own the minerals under the land, and by some conveyances the land became the property of D. P. Clements. Several years ago, when the oil boom started, this land, and also thousands of acres in various sections of the State, were classified as mineral lands by the Land Commissioner, and the State reserved the mineral rights. In 1919 the State issued a mineral permit to Edwin F. Smith to prospect for oil on the section in Reeves County.

Clements instituted the mandamus proceedings to compel the Land Commissioner to cancel the permit, and to change the records so as to show that the land had been classified as grazing land only, and also to enjoin the Land Commissioner from issuing any permits on the land. It was contended by Clements that the Land Commissioner was without authority to reclassify the land as mineral. The Supreme Court, however, in denying the mandamus held that the Land Commissioner had acted within his authority when he reclassified the land. If they can pull that off in Texas, they may be able to do it elsewhere.

Gas Flow Struck Near Canisteo

Hornell, N. Y.—A 50,000 cu. ft. per day flow has been struck at a depth of 525 ft. in a test well on the R. Dennis farm near the village of Canisteo, N. Y. The well is owned locally and gives evidence of being permanent. Drilling will be continued up to 700 ft., but the gas at 525 ft. will be used in the event that no better quality is found at a greater depth. George Davenport and Dr. Harry S. Stewart are among those interested in the company.

Power Company Bought

New York, N. Y.—The Tidewater Power Company, of Wilmington, N. C., controlling the electric light, gas and street railway companies of that city, has been bought by A. E. Fitkin & Co., of New York. The transactions involve $5,000,000. The property was acquired by a stock trans action.

Re-enters Plumbing and Heating Supply Business

H. F. Meyer has resigned his position as sales manager for the Detroit Brass & Malleable Works, Detroit, Mich., and will re-enter the wholesale plumbing and heating supply business. Mr. Meyer will join the Hiram Rivitz Company organization at Cleveland, Ohio. Mr. Meyer has had long experience and is well known in plumbing supply circles, especially in Cleveland, where he was actively engaged in this line from 1900 to 1919, etc.

Personal Notes

G. M. Sherman, formerly representing the Quigley Furnace Specialties Company, has connected with the Keystone Refractories Company, of New York, and has been made New England sales manager, with offices at 818 Hospital Trust Building, Providence, R. I.

Alfred Clark, who founded the Light, Heat & Power Corporation of Boston, Mass., which became the Massachusetts Lighting Companies, died last week at his home, on Main Street, Walpole, N. H., following a brief illness of heart disease. He was seventy-four years of age and was a native of Leicester, England. He was well known in the United States as a mechanical engineer and inventor, and installed the Lick telescope. As superintendent of a cotton mill at Lowell, Mass., Mr. Clark invented and perfected a cotton-picking machine, now in general use. He returned three weeks ago from Sarasota, Fla., where he passed the winter months.

The Columbia Gas & Electric Company has moved its executive offices from 62 Cedar Street to 61 Broadway, New York City.

Jacob B. Jones, new president of the New Jersey Gas Association and superintendent of the Bridgeton Gas Light Company's plant, Bridgeton, N. J., is the youngest man who has ever been selected to head the organization, which is one of the most influential in the State. Jacob B. Jones is a distinctively Bridgeton product. He was born in Bridgeton and made himself just what he is in the native town. He was a live-wire, thrifty sort of chap, while he was going to school playing hookey to go to the circus, a trick he has never outgrown. He sold newspapers, and had the biggest route of any of the Pioneer newsboys. He made money and saved it, and as soon as it was possible for him to get through the local schools, where he was taught a new system of writing which made him a freak penman, along with others who suffered by the experiment which was afterward abandoned, he entered a Philadelphia business school, and the day he went up to arrange to get in the institution he rode his bicycle to save carfare. The first and last real job Jones had was at the gas plant. The boy entered the office of the company as a clerk for Benjamin F. Harding, who was then the superintendent of the concern, and there were not more than a half-dozen employees in the plant. The young fellow was not satisfied with his office-boy job and he kept his eye open and his mouth shut while he learned something of the business, and when he was scarce a voter he was one of the most practical gasmen in South Jersey and gradually he assumed more important positions with the company, and as the veteran Mr. Harding was gradually relinquishing his activities Jones was taking up the responsibilities, and when the old superintendent retired Mr. Jones was put in his place. It has been since then that the Bridgeton Gas Light Company has made such gigantic strides, a progress which has been little less than phenomenal. The plant has been made many times greater than it was when Jones took charge, and he developed a service after the sale which has made the Bridgeton concern one of the foremost plants in the country. It may be said without fear of any argument about it that there is better and more instant service given the gas-light users of Bridgeton than any

city, large or small, in the country. There is nowhere an organization better equipped or more fully trained than the men who have been selected for the service by Mr. Jones. While the young gasman was developing into the gas business he found time to devote his energies to other activities. He was a mighty good newspaper man and for a time he seriously contemplated taking up that profession. He was for years city clerk of Bridgeton and one of the best officials the city has ever had. He also was for a year or two secretary to the president of the State Senate. As a young man he established the Bridgeton Pleasure Boat Company and established the big plant and excellent boat service which is enjoyed in Bridgeton by so many people. In recent years Mr. Jones has had many flattering offers to leave Bridgeton and take charge of plants of greater magnitude in larger places, but Mr. Jones' interests are centered in his own home town and he will probably stay here and assist in the development of the city, and is regarded as one of its most useful and foremost citizens.

Appointment

Arthur Sachsse Corporation, 6 West Thirty-second Street, New York, announces that it has been appointed the sole agent for the United States for the sale of the Keiser & Schmidt Thermo-Electric Remote Control Thermometers and Pyrometers.

Mangum to Get Gas Supply

Mangum, Okla.—Mangum citizens will be using natural gas next winter if plans of the Chamber of Commerce are carried through. A committee has been conferring with owners of gas wells in northeastern Greer County offering them a contract to supply the city.

Northern Indiana Gas Co. to Issue Bonds

Indianapolis, Ind.—An issue of approximately $30,000,000 worth of securities by the Northern Indiana Gas & Electric Company, to reorganize its "financial structure" and improve its plants in some of the thirty-seven cities where it operates, has been authorized by the Public Service Commission.

It is the largest issue of securities ever approved by the Public Service Commission.

Checking Up the Oil Industries

Returns now available show that for new oil charters filed in Feb., 1922, the capital reaches $100,173,000.

More than 6,000 permits to prospect for oil and gas on Government lands were issued in 1921, and the United States was paid in royalties $2,000,000.

Production of oil for 1921 shows the United States leading with 469,639,000 bbl., Mexico second with 195,064,000, Russia third with 28,500,000 bbl. Other countries in order are: Dutch East Indies, Persia, Rumania, India, Poland (Galicia), Peru, Japan and Formosa, Trinidad, Argentina, Egypt, Venezuela, France, Germany, Canada, Italy, Algeria and England. England shows but 3,000,000 bbl.

New Haven Gas Light Co.'s Bowling League Holds Banquet at Cape Mellone

The first annual banquet of the bowling league of the New Haven Gas Light Company was held last week at the Cafe Mellone and was attended by about sixty employees. A general good time was had by all present. The master of ceremonies being W. Doke Scott, who contributed very much to the enjoyment of the evening. C. H. Nettleton, president of the company, who was unable to be present, sent cigars with a very nice letter of regrets, which was read to those present. J. Arnold Norcross, secretary and treasurer of the company, was present and made a very interesting speech. R. E. Wyant, engineer of the company, was also present and made a few remarks congratulating the managers of the league, stating that both the men as well as the company were very much benefited by such an association. At the conclusion of his speech Mr. Wyant presented the winners of the season, the water gas plant, with a beautiful silver loving cup, stating that it would be held in their possession for one year, and to secure permanent possession of same must be won three times, either consecutively or otherwise. J. Coyne then made an acceptance speech in behalf of the winning team.

Short talks were given by C. E. Littell, assistant superintendent, and A. L. Sherwood, chemist, as well as captains of the various teams. J. Minor, draftsman of the company, gave a very interesting talk upon different national, State and civic problems.

The league, by unanimous vote, conferred honorary membership on C. H. Nettleton, president of the gas company, J. A. Norcross, secretary and treasurer, R. E. Wyant, engineer, and T. R. Sucher, assistant treasurer.

A very good menu was furnished by the Cafe Mellone.

The entertainment of the evening was as follows:

Community songs, led by C. F. Mansfield.
Harmonica selections, by John Flannigan.
Varied songs, by Miss Rose Berman.
Selections by Rialto Male Quartette.
Piano accompaniments were played by Edmund Southerton.

The success of the whole season, as well as the banquet, can be attributed to the untiring efforts of Harold N. Dorr, captain of the office team, and to show their appreciation, the captains of the other teams presented Mr. Dorr a handsome set of pipes and a pearl cigarette holder. The booby prize was given to Mr. Leonard, captain of the maintenance-department team.

The league is composed of the teams from the following departments of the plant:

Water gas plant.
Vertical retort house.
By-product plant.
Horizontal retort house.
Machine shop.
Fitting department.
Works office.
Maintenance.

The order in which these names are given represent their respective standing in the league.

Everybody was happy and charged with high spirits, and the banquet broke up shortly after midnight.

THE COLUMBIA GAS & ELECTRIC COMPANY reports for March an increase of $370,018 in gross earnings and an increase of $180,332 in net.

Philadelphia Company Awards Prizes in Fourth Suggestion Contest of First Year

The committee on suggestions, Philadelphia Company and subsidiary corporations, of Pittsburgh, Pa., has announced the awards for suggestions submitted during the closing period of the first year of the contest. This last period proved even more successful than the previous contests, the number of suggestions far outnumbering the three previous contests.

In speaking of the contest, Mr. Thompson, president, says in part: "The first year of the suggestion campaign was in the nature of an experiment. It has been so successful and reflects so much credit upon our employees that it will be made a permanent feature of our activities. I congratulate you upon the fine record you have made. You, your families, your friends, and associates can well feel proud of what you have achieved in one years. The results indicate our employees are far above the average in initiative and intelligence.

"All of our employees are deserving of commendation for the interest they are taking in the suggestion campaign. Each employee who has submitted a suggestion, whether or not it was adopted, will have an entry made on his service record, as an evidence of his interest in the company and his work. To stimulate further the interest in these contests and give increased recognition to the thinkers among our employees, I have authorized the committee on suggestions to double the amount of prizes for each three-month period.

"All of us live in the hope of attainment of success. Right or wrong thinking measures the degree of our success. Men and women may have education, experience and special training, but the most brilliant ideas are worthless unless they are expressed and benefit derived from them. Suggestions of the greatest simplicity are often most valuable. Many employees who at first had little confidence in their ability to make useful suggestions have won prizes and awards. All of our officers have been instructed that in the selection of employees for promotion, preference shall be given those who have won prizes and awards, or submitted a number of suggestions."

The first prize in the past contest was won by J. A. Fisher, assistant chief clerk, billing department, for devising a method of checking Duquesne Light Company customers' installations to determine the accuracy of the monthly service or demand charge. Mr. Fisher made his suggestion in the first contest and the matter has been under investigation since then It will result in better satisfied customers and a saving to the company. A department will be organized to handle the work involved.

The second prize was awarded to William H. Schuch, foreman in the service division of the Duquesne Light Company, for a suggestion that all pensioned employees of the Duquesne Light Company be given honorary membership in the light-company section and National Electric Light Association and that they be placed on the mailing list to receive "public service."

The third prize went to Victor G. Dry, engineer at the Freeport compressing station, who presented a suggestion covering a new installation for orifice meter gauge lines. This class of work has been of much trouble to the gas companies and the suggestion made by Mr. Dry will result in an improvement in operation and a saving to the company.

The fourth prize was received by William A. Coyle, clerk in the production and transportation department of the Equitable Gas Company for the suggestion that the words "walk in" be placed on the entrances to all public offices.

Prizes of $5 each were also awarded for the following suggestions:

Charles Wilhelm, 6306 Penn Aveneu, Equitable Gas Company, that safety rope be atached to pulley weights to air line in the meter shop of the Equitable Gas Company.

William P. Marcellus, Allegheny Heating Company, that brass tags be used on house lines to show the floor or apartment the gas line supplies.

James F. Moffat, telephone department, a tool for rodding ducts, for use by the telephone department and Duquesne Light Company.

Charles Patterson, Brunot Island Power Plant, that individual switches be placed on wall sockets in turbine room at the power plant.

W. Hinchliffe, Elrama gas plant, that boilers at the Elrama gas plant be equipped with draft gauges and stack pyrometers and that the boiler feed water meter or steam bow meters and coal meters be fitted on the chutes leading to each other. Also for suggestion that the control for the stack dampers be changed from the back of the boilers to the front where the fireman can operate the mmore conveniently.

Joseph Hagaman, Elrama gas plant, improvement of position of operator platform and control box at Elrama gas plant.

John Barrow, Elrama gas plant, that expansion plugs be placed two feet above each clean-out door at the Elrama gas plant.

George E. Kallock, Duquesne Light Company, Chamber of Commerce Building, that a sign be placed under ash bin at Twentieth Street plant directing truck drivers to Phipps power plant, where ashes are procurable.

A. M. Amon, Equitable Sales Company, East Liberty, that a sign over rear entrance to the East End store be replaced by a new sign reading "East End Gas & Electric Shop."

B. C. Dunlap, Seventeenth Street Incline Plane Company, that a butterfly valve be installed in main steam line on the Seventeenth-Street incline plane.

R. J. Clark, accounting department, that employment department secure proper names of foreign-born employees for insurance records.

Paul B. Williams, William Penn Substation, Duquesne Light Company, to improve emergency lights at the William Penn plant and that a covering be placed over limiting switches on ash elevator.

T. W. Noonan, office of assistant to president, that sign be removed from building at 551 Seventh Avenue bearing words, "Equitable Gas Company," and "Consolidated Gas Company," and that name "Harwick Coal & Coke Company" be placed on the door of the purchasing department in place of the "Equitable Coke Company."

W. T. Hawkins, Duquesne Light Company, Chamber of Commerce Building, that the words "Safety Always" be printed across Duquesne Light Company service division labor reports.

Clarence Struthers, Equitable Gas Company, that a labor distri-

bution board be placed in each district shop of the gas company stating the whereabouts of the foreman and meter setters for use in case of emergency and that an emergency box be issued to each district office of the gas company containing gas masks, safetv belts, ropes and first-aid kits, and every employee be acquainted with its location.

J. E. Staub and F. D. Wright, Equitable Gas Company, Sharpsburg, that instead of changing iron-cased meters on account of cracked dial glasses, meter and complaint men be instructed to change the glasses.

Michael Lippzer, Equitable Gas Company, that a tee with a plug be put on the end of service lines instead of an ell.

M. A. Dillon, Equitable Gas Company, that meter history cards in the district offices be carried under address at which the meters are actually set, also that history cards carry a notation in red ink indicating where gas is consumed, and that the office at South Seventeenth and Wharton Streets be connected with the meter proving room either by telephone or speaking tube.

D. S. Johnson, accounting department, that a manual of instructions for meter readers be prepared, and that all branch offices of the gas companies keep a file of all meter installations that are set and not turned on when set and that arrangements be made to ascertain if gas is being used.

R. J. Crabbe, Pittsburgh & West Virginia Gas Company, Weston, W. Va., that a female wood plug be used in plugging abandoned wells.

John B. Arnold, Pittsburgh & West Virginia Gas Company, Waynesburg, Pa., an improved type drip to be used in well-connecting lines.

Gordon S. Horner, Pittsburgh & West Virginia Gas Company, Waynesburg, Pa., a dynamite holder for shooting casing off of old wells.

W. L. Sheets, Pittsburgh & West Virginia Gas Company, Weston, Pa., that a form be adopted to be used by workmen in reporting leaks, irregularities, loose materials, etc.

R. N. Soper, treasury department, that rent accounts be carried as miscellaneous accounts receivable and that bills for rent be rendered with a coupon attached and handled when paid, the same as with other miscellaneous accounts receivable, and that charges be made in the name of the companies against employees bear the notation "Employee," with the company address and this information conveyed to the treasury department.

H. J. Weisberg, accounting department, that a change be made in the method of paying salesman's commissions, and that the word "building" be eliminated from all intercompany vouchers and billing.

Michael D. Lippzer and F. L. Vaughn, Equitable Gas Company, McKeesport, Pa., an improved method of standard gas meter manifold construction.

Stockholders Agree on Merger Plans

Columbus, Ga.—The stockholders of the Gas Light Company of Columbus and the Columbus Power Company met May 1 in the office of R. M. Harding, in a called session relative to the consolidation of these two companies with the Columbus Railroad Company, which was agreed upon when the directors of that organization met, at the call of the directors.

The plan proposed by these directors and acted upon favorably by the stockhelders of the railroad company were agreed upon, and no change will be made.

Under the proposed plan the three companies when merged into one will be known as the Columbus Electric & Power Company.

According to legal procedure the matter must be referred to all companies involved for their approval and also to the State Railroad Commission and to the Secretary of State for change in amendments to the charter of what is now the Columbus Railroad Company.

Gas Company Incorporates

Joplin, Mo.—The Empire National Gas Company of Delaware, with a capital stock of $12,000,000, has been incorporated in Missouri, with a capital stock of $150,000, with headquarters in Joplin. The company will produce, sell and transport gas, oil and other minerals. The shareholders are Bankers' Trust Company of New York City, M. R. Bump of Montclair, N. J., J. D. Crevelin of Brooklyn, N. Y.; F. L. Blackburn of Westfield, N. J., and others.

Mineral Wells Gas Rate Case Is Decided

Austin, Texas.—The Railroad Commission on April 26 entered its orders in the appeal cases affecting the gas rates at Mineral Wells and allowed some increases in the rates, but not as much as applied for, and also directed that the companies maintain better pressure and better physical facilities.

Appellants in the case, from the refusal of the city council to grant rate increases, were the Texas Distributing Company, and the consumers' Gas & Fuel Company. The following rates, with a monthly meter minimum charge of $1, were adopted for use in Mineral Wells: For the first 25,000 cu. ft., 60 cents per thousand cubic feet; for the next 25,000 ft., 50 cents per thousand; for next 50,000 ft. 40 cents per thousand; for next 100,000 ft. 30 cents per thousand; for next 300,000 ft. 25 cents per thousand, and all over 500,000 ft. 20 cents per thousand. However, these rates are subject to 5 cents per thousand discount where bills are paid on or before the tenth day following presentation of the bill.

In both cases the commission finds the rates allowed by the city inadequate and the service by the companies inadequate. A third finding as to the Texas Distributing Company is that the loss of gas by leakage is excessive and causing waste in violation of the commission's conservation rules and the laws of the State.

It is expressly provided that the orders affect the charges for natural gas only and do not change the rules for service; that the rate changes ordered be effective commencing with meter readings for the month of May; that adequate rates contemplate service, therefore all pipe lines be repaired and put in first-class shape so as to prevent leakage and that a pressure of at least four ounces be maintained at customers' meters. Furthermore, that the commission specifically retains jurisdiction in these cases to see that its orders are enforced for adequate service and other compliance.